BUILDING ENERGY CODES

FY 2005 Efforts Enhance Energy Efficiency in Buildings Nationwide

The U.S. Department of Energy (DOE) strives to improve energy efficiency by encouraging building owners and contractors to use new technologies and better building practices. DOE's Building Energy Codes Program (BECP) works with federal agencies, national code organizations, the building industry, and state and local officials to promote stronger building energy codes. BECP also provides financial and technical assistance and training to support state energy code activities. This report describes how BECP's efforts helped improve energy efficiency in the nation's buildings during FY 2005.

Key FY 2005 Activities

BECP's compliance and training tools deliver energy savings by helping designers, builders, product manufacturers, and code officials streamline energy code compliance and enforcement. The compliance software includes **RES*check***™, which applies to single-family and low-rise, multi-family dwellings, and **COM*check***™, which applies to all other buildings. These products are based on the International Code Council's (ICC) International Energy Conservation Code (IECC™) or on ANSI/ASHRAE/IESNA[1] Standard 90.1—the national model energy codes that serve as the basis of most state codes. The software packages are supported with accompanying users guides, videos, training materials, and compliance manuals.

In FY 2005, these popular products were enhanced in several ways:

Compliance Software

- **COM*check***™**.** BECP updated the software to support ASHRAE Standard 90.1-2004 and to support compliance for alterations and renovations. A new interface was added to make it easier to implement energy code requirements when the users make alterations to fully constructed buildings.
- **COM*check*-Web**™**.** BECP released this web-based tool that requires no download or installation, allows users to save projects online for easy access from home or remotely, and assures users that they are benefiting from the latest release of the software.
- **COM*check***™ **Beyond Code Advisor Prototype.** BECP developed the Beyond Code Advisor; it uses information from ASHRAE's Advanced Energy Design Guide for small office buildings to help prompt users to consider better-than-code options that will result in less costly, more durable, and more energy-efficient buildings.
- **RES*check***™**.** BECP updated **RES*check***™ to support using log walls in the project tab and to improve the thermal mass calculation for log wall construction. The update also included a beyond code advisor in all of the **RES*check***™ tools.
- **RES*check***™**- and COM*check***™**-Web Package Generators.** BECP redesigned the Package Generators for greater usability as well as an improved interface. Package Generators allow users to create their own code-compliant envelope packages based on building location, glazing area percentage, and their choice of insulation levels. In addition, BECP updated the database for storing project data from Package Generator compliance reports.

Codes & Standards Development

BECP works closely with the ICC, ASHRAE, IESNA, American Institute of Architects (AIA), and other code user groups to develop more stringent and easy-to-understand building energy codes and assess potential code barriers to new energy-efficient technologies. BECP codes and standards development activities for FY 2005 included:

[1] The American National Standards Institute / American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. / Illuminating Engineering Society of North America.

U.S. Department of Energy
Energy Efficiency and Renewable Energy

Since 1991, BECP has delivered cumulative

Online Permitting Makes Its Debut

In FY 2005, BECP integrated online permitting across all **RES*check***™ and **COM*check***™ compliance tools. This feature allows users to generate and e-mail a PDF report of the compliance forms directly from the software to code officials or jurisdiction. This feature has simplified the process builders use to receive a permit.

Before releasing this feature, BECP worked closely with the State of New Hampshire to resolve technical issues. In the months following the feature's release, more than 1,600 compliance reports were sent electronically. Many building departments would prefer to get the permit documentation using this approach.

Improving Residential Codes and Standards

BECP participated in the ongoing development of the IECC and the energy chapter of the International Residential Code, both of which are maintained by the ICC, by conducting technical analyses, developing new code language, and participating in reviews and commentary of others' code-change proposals. BECP also provided technical support and developed code-change proposals to ASHRAE SSPC 90.2. The contents of the 2006 IECC were finalized by the ICC in late FY 2005, setting the stage for DOE to work on the 2006 IECC determination in FY 2006.

Analyzing Residential Wall Insulation Options

BECP conducted a limited analysis of residential wall insulation options in support of DOE's assessment of third-party amendments to its recent comprehensive code change proposal.

Researching High-Return Residential Code Changes

BECP researched potential high-return changes to the residential provisions of the IECC. Code changes analyzed included duct testing, whole-house pressure testing, glazing orientation restrictions, lighting, verification of HVAC refrigerant charge, and improvements in hot water piping. Data on costs, performance, safety, durability, and other factors will be collected and used to make informed decisions on future residential code changes.

Providing Information on Home Energy Rating Systems

BECP worked with home energy rating system developers to forge connections between building codes and voluntary energy-efficiency programs. In addition, BECP began an effort to develop a mapping between the most common home energy rating system (specifically, the Residential Energy Services Network) and energy-efficiency codes. This provides information for states and others that may wish to add a home energy rating system compliance path to their code.

Updating the Federal Residential Standard

The Federal Residential Standard (FEDRES) was revised to be more closely based on the 2004 IECC with improved energy efficiency. With the issuance of the new Energy Policy Act in August 2005, DOE must now issue federal residential standards that include sustainable design principles. This standard, FEDRES, will be applied to all new and replacement buildings.

Improving Commercial Codes and Standards

BECP participated in the ongoing development of ASHRAE Standard 90.1, providing leadership and/or technical analysis for the ASHRAE SSPC 90.1 lighting, envelope, mechanical, and energy cost budget subcommittees. In addition, BECP participated in upgrading the IECC commenting on and submitting a number of proposed changes. The BECP also worked with ASHRAE's Code Interaction Subcommittee to help develop proposals for modifications to the IECC that would bring Standard 90.1 and the IECC closer together. Also, the BECP began work on the qualitative comparison of ANSI/ASHRAE/IESNA Standard 90.1-2004 to the 1999 edition.

Eliminating Code Barriers to New Technologies

BECP with the Building America teams developed new code language that eliminates barriers to the use of new technologies. Specifically, the team drafted new language to the code regarding the use of vapor retarders in modern, well-insulated, low-infiltration homes. BECP, Building America, and the National Renewable Energy Lab continue to work together to identify other code barriers that may require further training of builders, code officials, and designers of the development of code-change proposals. BECP collected a list of 35 issues from Building America.

Developing Advanced Energy Designs for Small Retail Buildings

Following completion of the Advanced Energy Design Guide for small office buildings, BECP expanded this collaborative effort to begin developing a guide for small retail building types. The next guide will be a prescriptive guide to achieve 30 percent energy savings above current ASHRAE/IESNA Standard 90.1-1999. Partners in this effort include ASHRAE, AIA, IESNA, and the U.S. Green Building Council.

Updating the Federal Commercial Code

BECP updated the new Federal Commercial Code (FEDCOM) standard to reflect the format and content of the recently published ASHRAE Standard 90.1-2004. The Energy Policy Act of 2005 requires that DOE publish new FEDCOM standards that require federal buildings be designed to achieve energy consumption levels that are at least 30 percent below the Standard 90.1-2004.

Technical Assistance and Training

BECP technical assistance and training activities help inform code officials, designers, builders, and others on developments in building energy codes and standards. These efforts also increase awareness and use of BECP compliance tools. In FY 2005, BECP expanded its outreach and training efforts.

Website Remains Popular Resource for Software and Training

Website use suggests increased interest in the new web tools, training, and web-based compliance tools, such as **RES*check*-Web**™ and **COM*check*-Web**™. During FY 2005, web tools averaged 1 million hits per month. This is an increase of 50 percent, with more than 10,000 registered users.

energy cost savings exceeding $4.7 billion

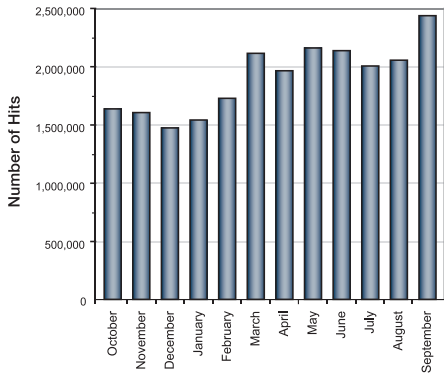

Figure 1. Monthly Website Hits (FY 2005)

User interest in desktop applications also remains very high, averaging 8,000 downloads per month. In August, the website attracted a record 2.5 million users, corresponding to a popular **COM*check***™ online training course.

Total software distribution for FY 2005 was 95,864: 35,345 for **COM*check***™ and 60,519 for **RES*check***™.

Newsletter Reaches 71,000 Readers

Subscriptions to *Setting the Standard* newsletter rose nearly 20 percent to a total of 71,000. *Setting the Standard* is a key instrument in information exchange for building industry professionals, state and local code officials, and other interested parties. It's a key source of important, late-breaking energy code information.

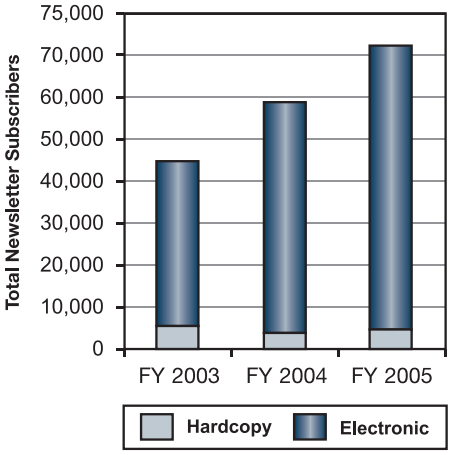

Figure 2. Newsletter Distribution

Energy Code Resource Center Expands

The online Building Energy Code Resource Center offers users a one-stop source of information on energy codes and beyond-code construction techniques and technologies. BECP added content and links on commercial codes and construction. The program also added 15 Code Notes—detailed discussions of specific energy-efficient building techniques. A goal of the Resource Center is to link users with web content from sources such as EnergyStar®, Building America, and code groups. In FY 2005, the Resource Center directed 30,000+ hits per month to these and other resources.

User Support Earns High Marks

In FY 2005, BECP responded to nearly 2,400 technical support e-mails. Also, BECP enhanced the technical support system in two ways. First, BECP developed the ability to track technical support requests for individual compliance tools. This feature allows the software compliance team to analyze the software feedback at a finer level. Second, one-third of BECP's customers receiving technical support now receive a "user support web feedback" form by e-mail. Results have been positive, with 84 percent of respondents rating the quality as either excellent or very good.

Media and Outreach Help Educate

BECP continued to stimulate awareness of the program through trade media. FY 2005 activities included:

- An article introducing the Resource Center and Code Notes to readers of *Home Energy Magazine*.
- A market transformation case study on how Georgia and Texas prepared for implementation of the 0.40 solar heat gain co-efficient required in the 2000 IECC.
- An article on code support tools and materials for the *Association of Energy Services Professionals* newsletter.

Training Efforts and Interest Accelerate

Users asked for more training, and BECP delivered. The program provided training to nearly 5,000 attendees primarily through web-based training. The approval rating for these events was very high, with more than 95 percent of the web participants rating the classes very informative and worthwhile. Highlights include:

- ***Lighting Standard 90.1-2004.*** With IESNA, BECP presented live web-based training on Lighting Standard 90.1-2004 to 2,000 lighting designers. BECP also conducted two "train-the-trainer" sessions on Standard 90.1-2004 for ASHRAE in support of their grassroots training program.
- ***Live Web-based COMcheck™ Training.*** BECP delivered training on using **COM*check***™. Nearly 800 architects, builders, code officials, and product manufacturers attended.
- ***Live Web-based REScheck™ Training.*** In May, BECP offered live, web-based **RES*check***™ training that attracted 455 participants—many of which received continuing education credits through the AIA.
- ***National Association of Home Builders.*** At the International Builders' Show/ Expo in Orlando, Florida, the DOE/ BECP booth attracted interest from 800 attendees. BECP trained 250 people on **RES*check***™ and residential energy codes, and distributed 564 CDs of the software.
- ***LightFair International.*** Held in New York, BECP provided hands-on **COM*check***™ training to 150 attendees. Also, 450 CDs of the software and 125 DVDs of the video "Inspecting to the Commercial IECC" were distributed.
- ***American Institute of Architects Expo.*** Held in Las Vegas, BECP provided **COM*check***™ training to 100 attendees, who received continuing education credits through AIA. BECP distributed more than 400 CDs of the software.

BECP added videos of the three web-based trainings to the website. Also, BECP made available online the new **RES*check***™ self-paced training course. Similar online courses on Codes 101 and **COM*check***™ were completed in October 2005. The program also added to the website a calendar listing energy and code training available from numerous organizations.

National Workshop on State Building Codes

In Austin, Texas, the BECP-organized workshop set a record for attendance: 235 people attended representing 36 states and territories. In addition, the pre- and post-workshop training sessions conducted by BECP were well attended, with more than 300 people participating.

DOE Regional Offices

Staff at the six DOE regional offices played a critical role in providing energy code financial and technical assistance to the states at the regional level, fostered regional cooperation, and arranged other assistance from within BECP.

BCAP Contributes to Code Adoption

BECP helps fund the Building Codes Assistance Project (BCAP), which helps state regulators and others adopt and implement building energy codes. For example, in FY 2005, BCAP helped Georgia, North Carolina, Ohio, and Virginia update their commercial energy code provisions to reference ASHRAE 90.1-2004. Also, BCAP helped the City of Phoenix, Arizona, adopt the 2004 IECC, and provided crucial energy code advocacy support in Indiana, Iowa, and Illinois. The project provided stakeholder outreach through a newsletter and website.

Technical Assistance Supports States' Efforts

On request, BECP provides direct technical assistance to states and local jurisdictions to help them adopt, implement, and enforce building energy codes. In FY 2005, technical assistance was provided to:

- **Arkansas.** In response to the new 2004 Arkansas Energy Code, BECP presented commercial code training at the Arkansas AIA state convention as well as to local ASHRAE members. A total of 450 code officials, architects, engineers and lighting designers received training. BECP also updated **RES*check***™ to accommodate the new Arkansas code.
- **Arizona.** BECP evaluated the impact of adopting a commercial energy code in Arizona. Using five Arizona locations, BECP analyzed and compared the commercial building envelope and lighting requirements in ASHRAE 90.1-2001, 90.1-2004, 2003 IECC, and the IECC 2004 Supplement. BECP also quantified the impacts of adopting the IECC 2004 Supplement as the residential energy efficiency code in the City of Phoenix.
- **Texas.** BECP analyzed the technical feasibility of recommended commercial lighting amendments to the 2003 IECC. BECP projected the energy and consumer cost savings, as well as implementation costs, from 2005 through 2030. In addition, BECP analyzed the energy, pollution, and construction cost impacts of raising the residential building energy code to nearly 15 percent above the IECC 2003. BECP developed climate-specific packages that exceed the IECC, are cost-effective, and emphasize strategies that may be acceptable to home builders.
- **South Dakota.** BECP surveyed builders on current building practices, performed building simulations, and developed impact tables.

DOE Special Projects Grants

In FY 2005, DOE awarded $2 million in grants on a competitive, cost-shared basis. These grants helped support the building energy code work of over 20 states, including:

- **Illinois.** This project prepared the building, construction, and regulatory communities for the adoption of the 2000 IECC as amended by the 2001 Supplement, which will take effect in spring 2006. This project structured its outreach and training efforts to inform local stakeholders about the content and value of the new codes through varied learning formats.
- **Oregon.** This project researched and analyzed above-code measures, exterior lighting options, and code enforcement and compliance options. It made recommendations to the Oregon Building Codes Division for potential adoption.
- **Multi-State–Georgia, South Carolina, and Alabama.** This project used emerging trends in the residential and commercial design and construction industry to help increase awareness of the benefits of adopting and enforcing energy codes. The project also provided technical assistance and comprehensive training for code officials, design and construction professionals, trade contractors, and others.
- **Texas.** This project enhanced the understanding and enforcement of adopted energy codes by continuing and enhancing training, conducting field evaluations to identify the level of compliance, and evaluating the impact of DOE climate zone changes on overall stringency. It improved the uniformity of interpretation and local implementation by training energy inspectors and design professionals.
- **Multi-State–California, New York, and Arizona.** This project developed the Energy Efficient Online Training Academy to educate the design, construction, and enforcement communities on technical and administrative aspects of statewide energy codes. Through webcasts, videos, graphics, text, and online resource links, the tool offers energy code information to the building community, making it easier to learn the details of the codes and quality construction methods.
- **Utah.** This project provided quality residential and commercial building energy code training curricula and resources. The project strengthened and maintained a code-specific Internet presence and website. In addition, the project developed specific Site Inspection Guides. Finally, the project expanded the pool of qualified individuals to help with code compliance related to ASHRAE 90.1-2004 for state and educational buildings.
- **Vermont and New Hampshire.** These states are working together to implement recently updated building energy codes. The grant helped develop revised commercial training curricula, including beyond-code training elements based on New Building Institute's Advanced Building Guidelines/E-Benchmark. The project supported stakeholder outreach and updated the Vermont and New Hampshire Field Guide.

Building Energy Codes
U.S. Department of Energy

CONTACT INFORMATION

Building Energy Codes Website:
www.energycodes.gov

Tech Support:
www.energycodes.gov/support/helpdesk.php

RES*check*™ and **COM*check***™ can be freely downloaded directly from the Energy Codes website.

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Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

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